First Time On-orbit Calibration of the Japanese Earth Resources Satellite-1 Optical Sensor Using the Airborne Visibl~-infrared Imaging Spectrometer-1992

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The Japanese Earth Resources Satellite-1 (JERS-1) that carries an opti cal sensor (OPS) was launched in early 1992. OPS has 8 channels ranging in width from 60 to 130 nm in the spectra] region from 400 to 2500 nm with a "/5 km swath and 20 m spatial resolution. On-orbit calibration of this sensor is required to retrieve geophysical parameters of the earth's surface. Furthermore, calibration is required for comparison of JERS-1 OPS derived parameters from region to region and from time as well as for analysis of JERS-1 OPS data with measurements acquired with other spaceborne, airborne and surface instruments.

The Airborne Visible-Infrared Imaging Spectrometer-1992 (AVIRIS-92') is a NASA-sponsored Earth-looking imaging spectrometer designed, built. and operated by the Jet Propulsion Laboratory. This imaging spectrometer measures the total upwelling spectral radiance from 400 to 2500 nm in the electromagnetic spectrum through 224 channels at_ 10 nm spectral interval s . Data are acquired as 11 km by Up to 100 km images with 20 m by ?0 m spatial resolution.

01"1 August 27th, October 6th and October 9th calibration experiments were carried out under clear sky conditions at Rogers Dry Lake, Ivanpah Playa, California and Lunar Lake, Nevada, respectively. A radiance-based calibration of the 32,768 detectors of the JERS-1 OPS sensor for these three dates was carried out using AVIRIS-92 as a calibrated spectra] radiometer. The flight path of AVIRIS-92 for each site was orthogonal to the JERS-1 Ground track. Each AVIRIS-92 flight_ line contained a uni form dry lake calibration target and extended 100 km in length to encompass the full JERS-1 OF'S cross-track swath. To limit the effects from time-variable atmospheric transmittance, the time of the AVIRIS-92 overpass was synchroni zed with that. of the JERS-1 data acquisition. A reflectance-based inflight calibration of AVIVIS-92 was implemented using the dry playa lake targets and simultaneous atmospheric and surface measurements in conjunction with the MODTRAN '2a radiative transfer code. The calibration results as wel] as the random and systematic errors associated with this novel satellite calibration procedure using AVIRIS-92 will be described anti evaluated.